



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,451	07/23/2003	Jan Raebiger	2000.108200	7974

23720 7590 12/27/2004

WILLIAMS, MORGAN & AMERSON, P.C.
10333 RICHMOND, SUITE 1100
HOUSTON, TX 77042

EXAMINER

MATHEWS, ALAN A

ART UNIT	PAPER NUMBER
----------	--------------

2851

DATE MAILED: 12/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/625,451	Applicant(s) RAEBIGER ET AL.	
	Examiner Alan A. Mathews	Art Unit 2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7-15-04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6, 7, 13 - 16, 20, and 26 are rejected under 35 U.S.C. 102(a) as being anticipated by Bode et al. (U. S. Patent Application Publication No. 2002,0106821 A1, cited on Applicant's PTO-1449). Bode et al. discloses in figures 2 and 3 and pages 3 and 4, paragraphs # 31-35, a method of determining the exposure dose (exposure parameter) for a multi-step exposure process in a semi conductor line. Paragraph # 34 further discloses measuring the thickness of the layers of photoresist at various locations across the surface of wafer 21, which is the step of obtaining information about an inline parameter (layer thickness) indicative of a characteristic of a predefined location on a substrate (wafer). The controller 38 then determines, based upon the measurement data by metrology tool 29, the exposure dose in the stepper 30, which is the step of updating at least one exposure parameter (exposure dose) for said predefined location on the basis of said information. Step 37 in figure 4 and paragraph # 35 disclose that the exposure process is comprised of across wafer variation in exposure dose in response to the thickness measurements. With respect to claim 4, figure 3 discloses measurement data by

Art Unit: 2851

metrology tool 29 occurring prior to exposing the substrate by stepper 30. With respect to claim 6, paragraph # 34 states “The measurement data provided to the controller 38 may be **averaged** or otherwise statistically manipulated in the controller 38”. With respect to claim 13, the “target offset” is just the difference of the exposure parameter (exposure dose) that is adjusted as a result of the measurement data. With respect to claim 14, paragraph # 35 discloses measuring the thickness 26 of the layer of photoresist 25. In addition, paragraph # 10 discloses variations in the topology of one or more of the underlying films in process layers. With respect to claim 15, paragraph # 28 recites using a mask. Paragraph # 28 also recites forming a layer of photoresist material above a process layer, which would be the step of preparing said substrates for receiving a resist mask. The exposure map would be the exposure dose, which is based on location within the substrate.

3. Claims 1-3, 5, 13 – 15, 17, 19, 23, 24, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Miller et al. (U. S. Patent No. 6,259,5210). Miller et al. discloses in figures 2 and 3 and column 3, lines 10-67, a scatterometer 140 that obtains information about an inline parameter (intensity of the reflected light from the wafer). Column 4, lines 8-17, discloses changing the recipe of the stepper which is updating the exposure parameter (exposure energy or duration of exposure) based on the information. With respect to claims 5 and 23, figure 2 discloses that the measurement from the scatterometer 140 occurs after exposure in stepper 110. With respect to claim 13, the “target offset” is just the difference of the exposure parameter (exposure energy or duration) that is adjusted as a result of the measurement data. With respect to claim 14, column 3, lines 66 and 67, and column 4, lines 1-7, disclose measuring a variation in

Art Unit: 2851

the line widths of the baked region, which would be by a topography of the substrate. With respect to claim 15, preparing the substrate for receiving a resist mask would be forming a resist layer on the wafer (see claim 1 of Miller et al.). Establishing an exposure map would be the exposure recipe for the stepper. Column 3, lines 27-29, disclose adjusting the recipe of the stepper 110 based on the wafer measurements. This is updating the exposure map for a plurality of specified locations (such as in the middle and the periphery, see column 3, line 66). Exposing the substrate would be done by stepper 110.

4. Claims 1–26 are rejected under 35 U.S.C. 102(b) as being anticipated by Park U. S. Patent Application Publication No. 2002/0001070, cited in Applicant's PTO-1449). Park discloses in figure 1 and paragraph # 35, 36, and 40, an after development inspection (ADI) process 30 (after exposure) for obtaining information about an inline parameter (line width). Paragraphs # 44 and 61 disclose updating an exposure parameter (exposure time) on the basis of process 30. With respect to claim 4, paragraph # 54 and 56 further disclose that the pre-exposure step process 10 should help determine the photo-exposure time. Note that a sentence in paragraph # 56 states **“Also, the thickness of the silicone-nitride film, which has been formed in a pre-exposure step process of each prior task, is inspected, as are the line widths obtained from ADI when a desired photo-exposure time is used in the photo-exposure process”**. Thus, both pre-exposure and post-exposure measurements are taken to determine the photo-exposure time. With respect to claim 8, the plurality of inline parameters would be both the thickness of the film and line widths. With respect to claim 6, paragraph # 45, 48, and 63 disclose averaging. With respect to claim 13, the target offset is the change in exposure time

Art Unit: 2851

ΔET (based on the measurements). With respect to claim 15, the pre-exposure step 10 includes depositing silicon-nitride film on the surface of a wafer, which would be the step of preparing the substrate.

5. Claims 1, 3, 5, 6, 7, 13 – 15, 17, 19, 23, 24, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Luhn U. S. Patent Application Publication No. 2002/0012861, cited on Applicant's PTO-1449). Luhn et al. discloses in figure 2 and paragraphs # 60-66, obtaining information (measuring) about an inline parameter (line width or positional errors). Corrections for the exposure dose or intensity E and the xy positioning are then calculated, which would be the updating of at least one exposure parameter (exposure intensity E). With respect to claim 6, the last three lines of paragraph # 60 and the last three lines of paragraph # 62 disclose averaging the line width. With respect to claim 13, the correction values for exposure intensity E would be the target offset. With respect to claim 14, the line width would be the topography of the substrate. With respect to claim 15, lines 1-7 of paragraph # 60 disclose establishing an exposure map for a step and repeat (photostepper) exposure of the substrate. The preparing of the substrates would be placing a photoresist layer on the substrate.

Conclusion

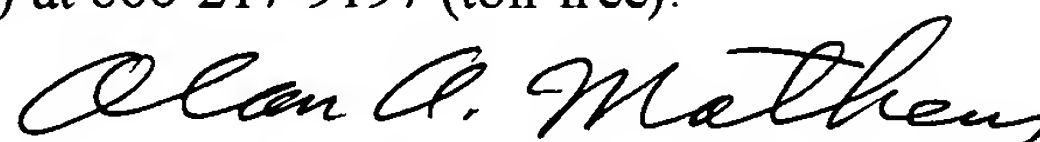
6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patents on Applicant's PTO 1449 are cited for the same reasons Applicant cited them in his INFORMATION DISCLOSURE STATEMENT.

Art Unit: 2851

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan A. Mathews whose telephone number is (571) 272-2123. The examiner can normally be reached on Monday through Friday from 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alan A. Mathews
Primary Examiner
Art Unit 2851

AM